STi7167

Advanced STB decoder with integrated DVB-T/DVB-C demodulator

Data brief

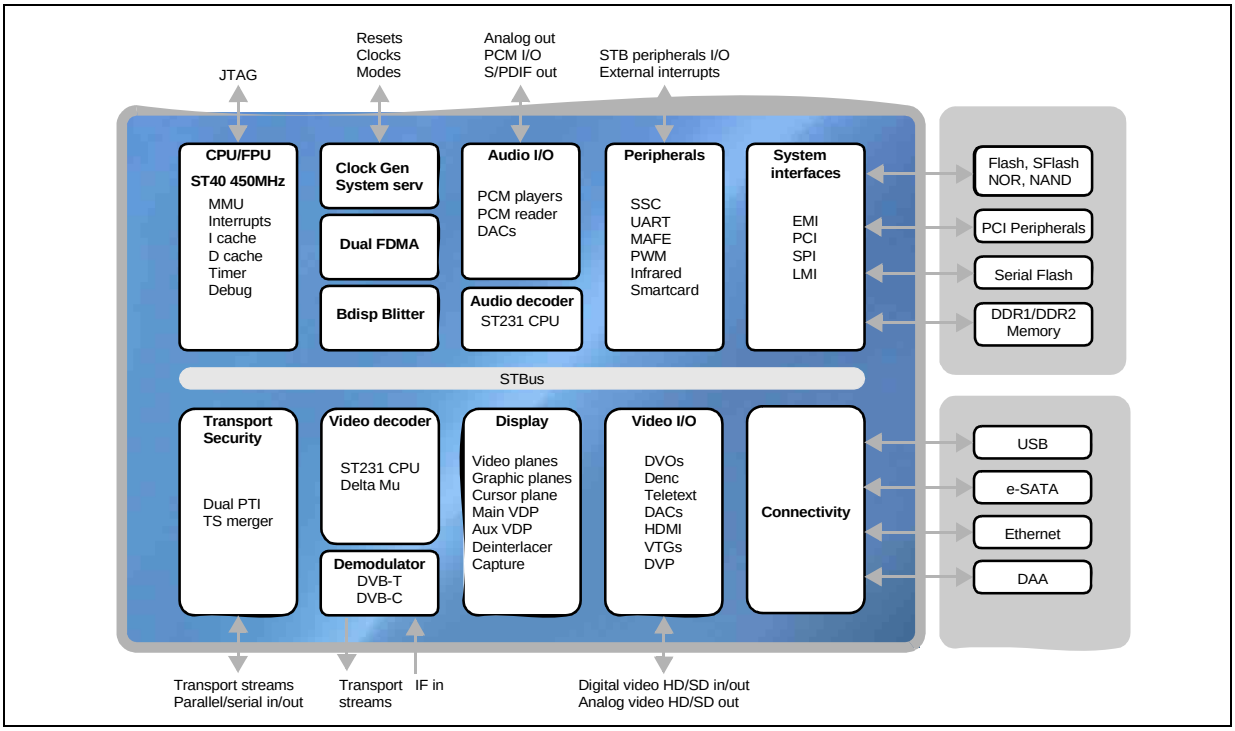
Features

- Integrated DVB-C or DVB-T demodulator
  - User-selectable mode
  - Compatible with low to high IF tuners
  - Flexible clock management
  - ADC for RF signal strength indicator
- Advanced high-definition video decoding (H264/VC-1/MPEG2)
- Advanced standard-definition video decoding (H264/VC-1/MPEG2/AVS)
- Advanced multichannel audio decoding (MPEG 1, 2, MP3, DD/DD+, AAC/AAC+, WMA9/WMA9Pro)
- Linux, Windows CE and OS21 compatible ST40 applications CPU (450 MHz)
- 32-bit DDR1/DDR2 compatible local memory interface
- Multi-stream, DVR capable transport stream processing
- Extensive connectivity (dual USB hosts, e-SATA (optional), Ethernet MAC/MII/RMII and PCI)
- Advanced security and DRM support including SVP, MS-DRM and DTCP-IP

Description

The STi7167 uses state-of-the-art process technology to provide a fully featured HD AVC, DVB-C, and DVB-T demodulator/decoder IC.

It is a highly integrated system-on-chip, suitable for STB markets across cable, terrestrial, and terrestrial/IP hybrid networks worldwide.



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1 Introduction

The STi7167 is targeted at the latest Operator and CE manufacturer requirements for STBs that use advanced HD decoding (H264/VC-1/MPEG2), and which conform to DVB, ISMA, ATIS-IIF, SCTE, ATSC, ARIB, CEA, ITU, OpenCable and MSTV specifications.

The STi7167 provides a solution for operators to specify a range of low-cost, high performance HD STBs including low-cost zappers, IP clients, interactive STBs, DVR standalone and DVR server/home network-capable STBs, and with content delivery possible using broadcast or broadband networks, or both (hybrid STBs). The STi7167 keeps pace with the latest conditional access, DRM and trusted platform requirements of major operators worldwide by incorporating the latest generation of advanced security features.

The STi7167 offers current users of ST's growing family of advanced decoding ICs enhancements in performance and features, while reducing cost and time-to-market for the next generation deployments.

Features	Benefits
Combines a configurable DVB-C/DVB-T demodulator with STB decoding and display functions	This highly integrated SoC helps to reduce board area and manufacturing cost, allowing low cost and small size STBs to be designed for either DVB-C or DVB-T networks
ST40-300 applications CPU @450MHz, 32K I cache, 32K D cache	Up to 800DMIPs superscalar performance from a single CPU core, using standard tools and operating systems (Linux, OS21)
STMicroelectronics' DELTA video decoding system with ST231 processor	Decoding of advanced high definition standards for MPEG2, H264, VC-1 broadcast, with the performance and flexibility for web-based content decoding such as Flash, DivX, MJPEG and Real
Dual USB 2.0 hosts, optional e-SATA, Ethernet MAC with MII/RMII and TMII, PCI	Extensive high speed connectivity for the widest range of STB peripherals, such as Flash drives, external HDDs, home network controllers (for example MoCA, Wi-Fi), DOCSIS modem and so on
Low power process, design and architecture	Best in class, low power standby mode, to meet emerging energy standards for STBs. Dynamic configuration of power to individual sub-systems enables power-efficient active standby modes
Advanced 2D graphics and display subsystem which also supports 3D user interface effects and 1080p60 display output	Allows visually appealing user interfaces and video rich navigation to be offered to consumers, while high quality progressive output can be watched on the latest high definition displays

1.1 STi7167 features summary

The STi7167 has the following main features:

- DVB-T demodulator
- General features:
  - Wide-range carrier tracking loop for large offsets recovery
  - Dual ADC for IQ baseband interface
  - Dual SD digital split AGC for RF and IF/BB
  - Gain control
- Channel impairments management:
  - Nordig Unified (v2.0) compliant
  - DTG 5.0 and Digitenne compliant
  - Built-in channel reception quality indicators
  - Out-of-guard interval echoes compatible
  - Impulsive noise rejection capable
  - Outstanding adjacent and co-channel rejection capability with integrated and flexible digital channel filtering
  - High-performance digital carrier, timing and symbol recovery loops
- Decoding capabilities:
  - ETSI EN-300744 v1.5.1 compatible
  - 2-K and 8-K FFT
  - 6, 7 and 8 MHz channel bandwidths
  - 1/4, 1/8, 1/16, 1/32 guard-interval length
  - QPSK - 16QAM - 64QAM modulations
  - Hierarchical modulation capability
  - TPS decoding
  - Puncture rates are 1/2, 2/3, 3/4, 5/6, 7/8
  - Outer Reed-Solomon decoder as per DVB-T standard
  - Energy dispersal descrambler
- DVB-C demodulator
- Decodes ITU-T J.83-Annexes A/C and DVB-C bit streams
  - High-performance integrated ADC for direct IF architecture in all QAM modes
  - Supports 16, 32, 64, 128 and 256 point constellations
  - Variable symbol rates
  - Front derotator for better low symbol rate performance and relaxed tuner constraints
  - Integrated matched filtering
  - Robust integrated adaptive pre- and post- high multi-tap equalizer
  - On-chip FEC A/C with ability to bypass individual blocks
  - Fast signal acquisition
- ST40-300, dual-issue applications CPU with 32KI, 32KD caches; Target speed 450 MHz delivering 800 DMIPs
  - Includes a tightly coupled vector FPU to accelerate 3D graphics transformations

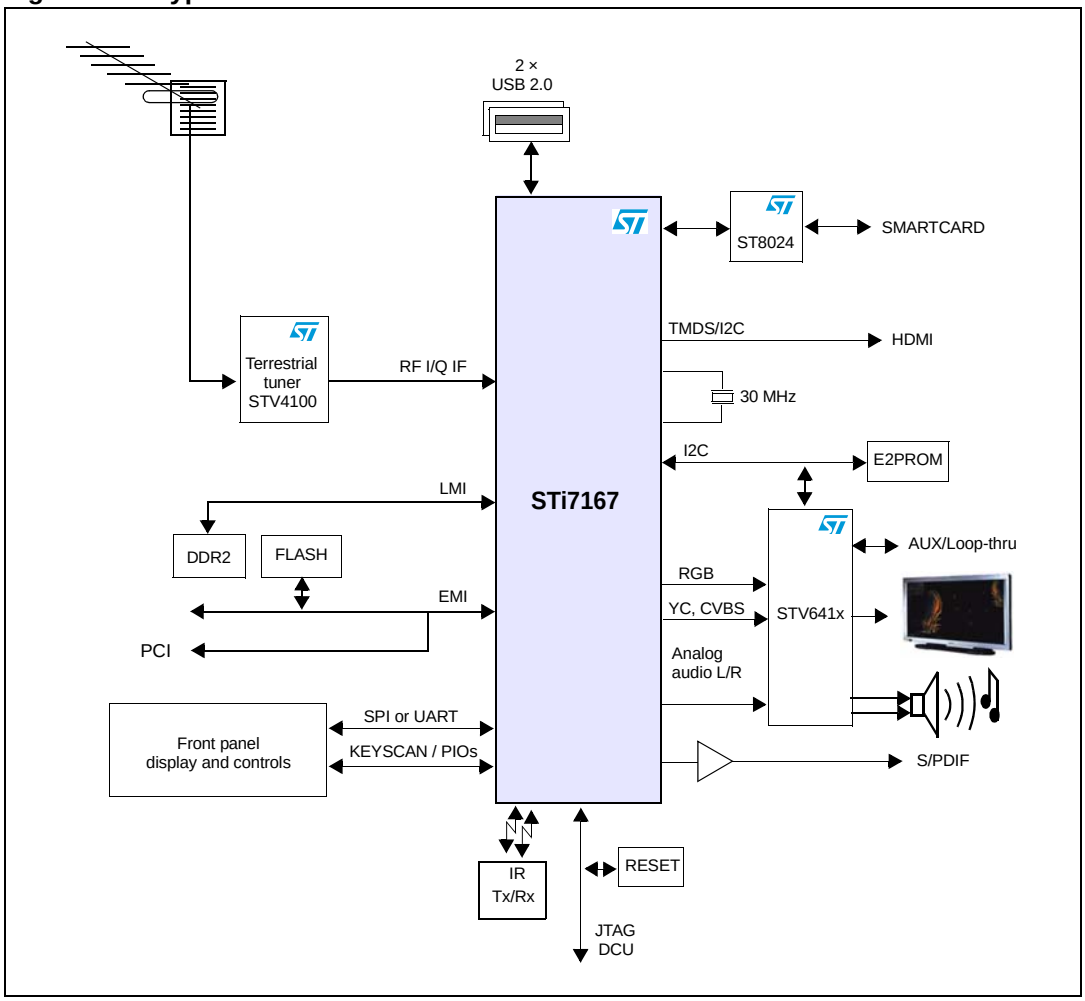
- Single 16/32-bit DDR1/DDR2 Local Memory Interface up to 400 MHz
- Latest generation “Delta” video decoder (RASTA) with ST231 programmable CPU core:
  - MPEG2, H264, VC-1/WMV9, HD or SD advanced video decoding
  - Provides flexibility to support other codecs, for example MPEG4 Pt2, DivX, XviD, H263 encode/decode, Flash (Sorenson, ON2/VP6), AVS-SD
  - HD + SD decoding or Dual SD decoding, PIP and Mosaic capable
  - Real-time transcoding of MPEG2 SD to H264 SIF
- Advanced de-blocking of decoded MPEG2 SD sources based on ST’s DSE (Digital Source Enhancer) technology with 2D analysis window and texture adaptive filter
- ST231 CPU based audio decoder. MPEG1 I/II, MP3, Dolby Digital/DD+, MPEG4 AAC/AAC+ multichannel audio decoding. Concurrent audio description decoding. DD+ to DD and AAC+ to DTS/DD transcoding
- Main and Aux video display pipelines:
  - Main: high quality H & V reformatting/resizing with sample rate conversion/filtering. Motion adaptive spatial and temporal de-interlacing for 480p/576p and 1080p60 progressive output
  - Aux: high quality H & V reformatting/resizing with sample rate conversion/filtering
- Three independent graphics planes with H&V resize, CLUT and anti-flicker filtering
- Link list, graphics blitter. Supports rendering of 2D graphics and 3D user interface effects. Up to 200 Mpixels/sec with destination alpha blending.
- Independent Main and Aux display compositions (video/graphics mixing)
- Pass-through display for graphics, Main video or Aux video output concurrently with Main and Aux compositions
- HD display capture and down-conversion for concurrent HD and SD output of the main composition
- HDMI 1.3a interface with HDCP copy protection. (HD/ED/SD formats up to 1080p60)
- 16-bit digital video output for main display composition (HD/ED/SD formats up to 1080p60)
- 2nd 24 bits + 8 bits alpha digital video output for pass-through display or Main/Aux display compositions (HD/ED/SD formats up to 1080p60)
- PAL/NTSC/SECAM digital encoder
- Six 10-bit DACs for component/composite analog video output (HD/ED/SD formats up to 1080i)
  - DACs available for HD+SD output or all can be used for SD output with concurrent HD over HDMI
- Digital video input port, 8-bit SD and 16-bit HD YCbCr 4:2:2 formats supported
- Integrated stereo audio DAC
- Six-channel audio PCM output interface
- Stereo audio PCM input interface
- Independent S/PDIF output
- Quadruple external TS input, triple internal TS from memory
  - One input is dedicated to output from internal demodulator
- Dual DVB-CI+ modules supported
- Multi-stream transport stream de-multiplexing, 400 Mbits/sec, quad tuner DVR capable

- DVB/DES/TDES/AES/Multi-2/ICAM2.2 descrambling
- ATIS-IIF and DVB-CI+ descrambling
- Dual USB 2.0 Host interfaces including PHYs
- Optional e-SATA HDD interface including PHY
- Integrated Ethernet GMAC, Wake on LAN, multiple hardware address filters, supports MII/RMII, Turbo MII up to 300 MBits/sec
- 16-bit external memory and peripheral interface (EMI)
- Interfacing to and boot from parallel NOR FLASH, NAND FLASH or serial NOR FLASH
- 32-bit, 33 MHz, PCI Interface, shared on EMI with access interleaving possible
- DVR supported with HDD attachment via e-SATA, EIDE (PIO mode) or USB.
- Dual multichannel flexible DMA controllers
- STB peripherals
  - 2 × Smart Card, 4 × UARTs, 4 × SSC/I²C, GPIO banks with alternate functions, IR Tx/Rx, UHF Rx/SCD, PWM, ILC, HDMI CEC, 4 × 4 key matrix scanner
- Advanced security - Secure control words, Code authentication, JTAG locking, Network/DVR copy protection, SVP, VGS, DTCP-IP, MS-DRM, MSTV
- Package: 27 mm × 27 mm FPBGA, 700 balls, pitch 0.8 mm, ball 0.5 mm

2 Target applications

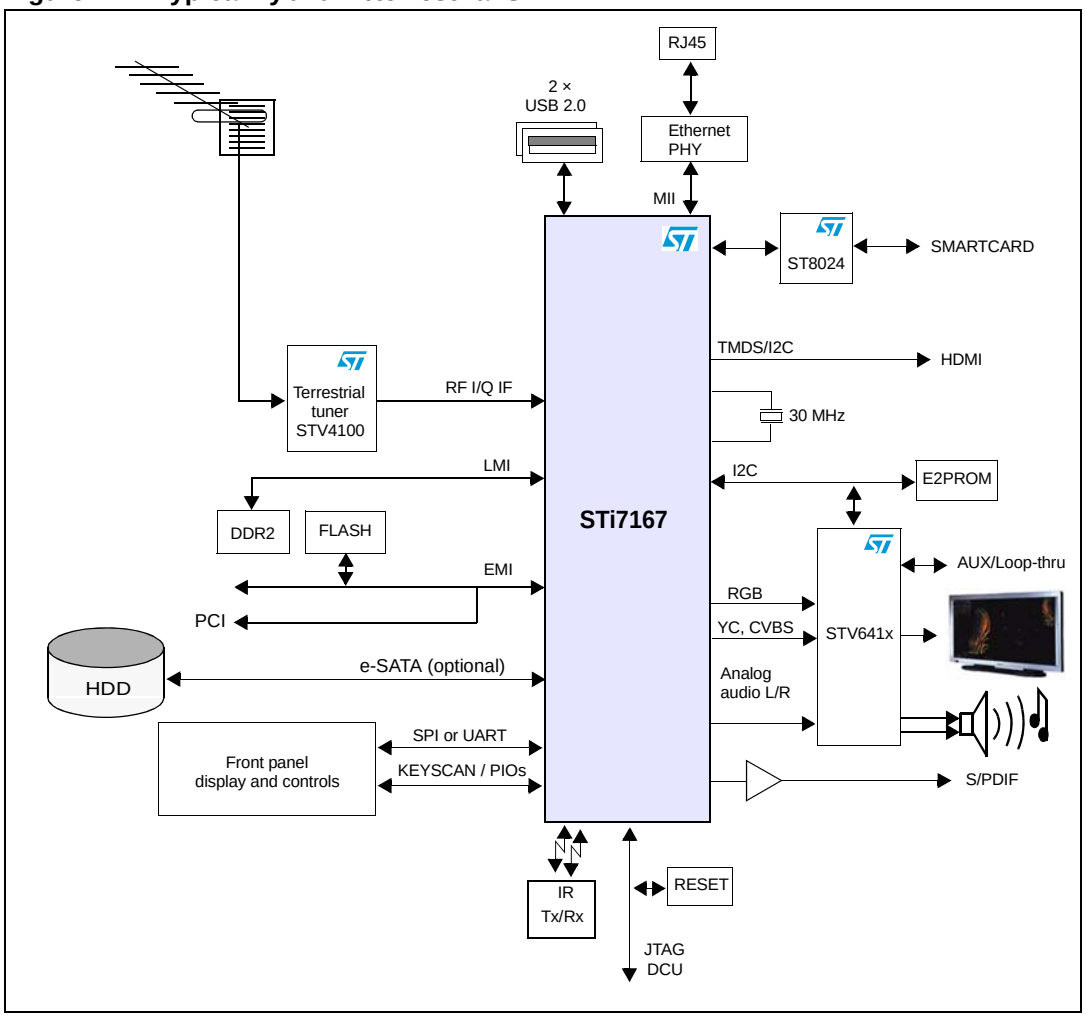
2.1 Terrestrial STB

Figure 1. Typical terrestrial STB



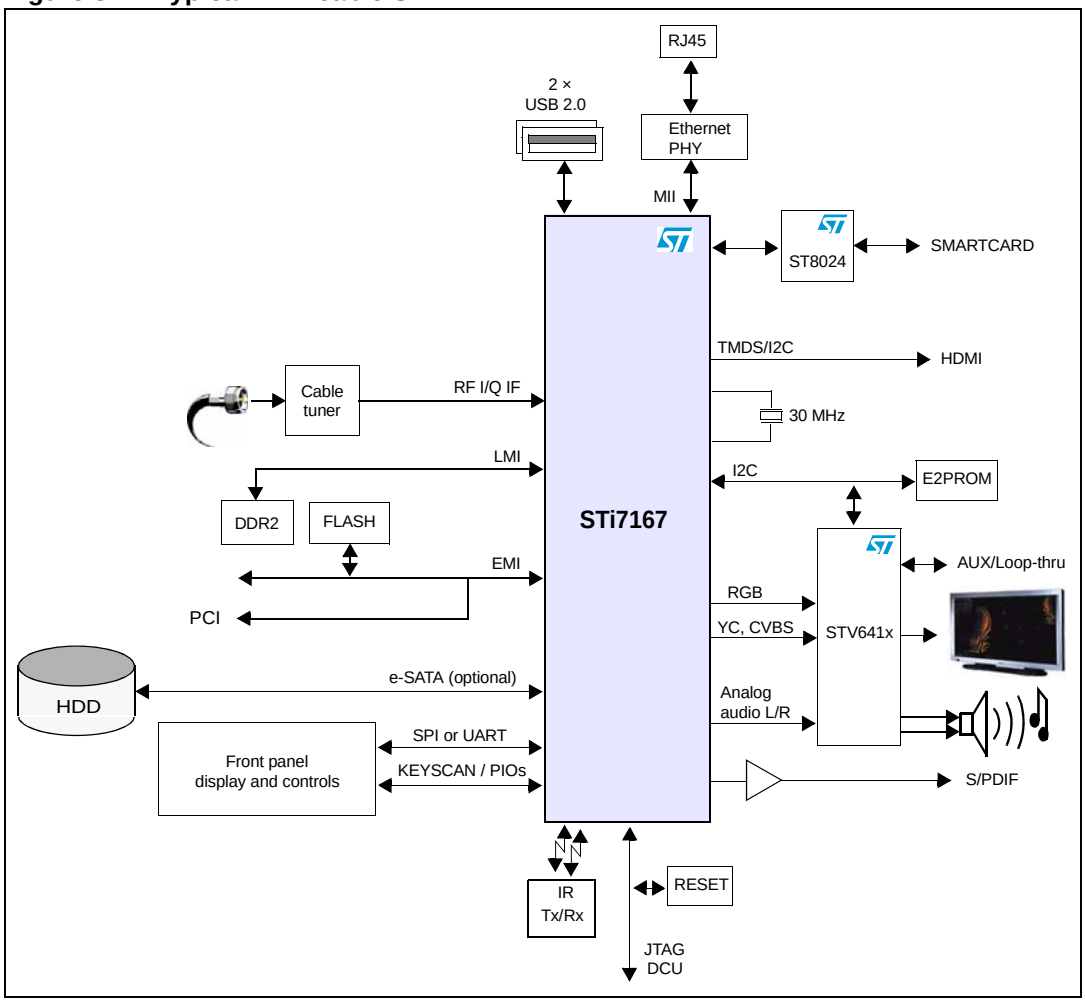
2.2 Hybrid IP/terrestrial STB

Figure 2. Typical hybrid IP/terrestrial STB



2.3 Cable applications

Figure 3. Typical DVR cable STB



3 Ordering information

Table 1. Ordering information

Order code	Packaging	Description
STi7167ZUC	FPBGA 27 mm × 27 mm	Development version, all options

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
16-Jun-2009	1	Initial release.
25-Aug-2009	2	Features/benefits table added.

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